data rate will provide more spectral efficiency than the standard data rate.

(9) Transmitters used for stolen vehicle recovery on 173.075 MHz must comply with the requirements of § 90.20(e)(6).

(k)(1) For transmitters operating on frequencies in the 220–222 MHz band, certification will only be granted for equipment with channel bandwidths up to 5 kHz, except that certification will be granted for equipment operating on 220–222 MHz band Channels 1 through 160 (220.0025 through 220.7975/221.0025 through 221.7975), 171 through 180 (220.8525 through 220.8975/221.8525 through 221.8975), and 186 through 200 (220.9275 through 220.9975/221.9275 through 221.9975) with channel bandwidths greater than 5 kHz if the equipment meets the following spectrum efficiency standard: Applications for part 90 certification of transmitters designed to operate on frequencies in the 220–222 MHz band must include a statement that the equipment meets a spectrum efficiency standard of at least one voice channel per 5 kHz of channel bandwidth (for voice communications), and a data rate of at least 4,800 bits per second per 5 kHz of channel bandwidth (for data communications). Certification for transmitters operating on 220–222 MHz band Channels 1 through 160 (220.0025 through 220.7975/221.0025 through 221.7975), 171 through 180 (220.8525 through 220.8975/221.8525 through 221.8975), and 186 through 200 (220.9275 through 220.9975/221.9275 through 221.9975) with channel bandwidths greater than 5 kHz will be granted without the requirement that a statement be included that the equipment meets the spectrum efficiency standard if the requests for certification of such transmitters are filed after December 31, 2001.

(2) Certification may be granted on a case-by-case basis by the Commission's Equipment Authorization Division for equipment operating on 220–222 MHz band Channels 1 through 160 (220.0025 through 220.7975/221.0025 through 221.7975), 171 through 180 (220.8525 through 220.8975/221.8525 through 221.8975), and 186 through 200 (220.9275 through 220.9975/221.9275 through 221.9975) with channel bandwidths greater than 5 kHz and not satisfying the spectrum efficiency standard identified in paragraph (k)(1) of this section, if requests for part 90 certification of such transmitters are accompanied by a technical analysis that satisfactorily demonstrates that the transmitters will provide more spectral efficiency than that which would be provided by use of the spectrum efficiency standard.

(l) Ocean buoy and wildlife tracking transmitters operating in the band 40.66–40.70 MHz or 216–220 MHz under the provisions of § 90.248 of this part shall be authorized under verification procedure pursuant to subpart J of part 2 of this chapter.

[43 FR 54791, Nov. 22, 1978; 44 FR 32219, June 5, 1979, as amended at 50 FR 13606, Apr. 5, 1985; 52 FR 47570, Dec. 15, 1987; 53 FR 1024, Jan. 15, 1988; 54 FR 38681, Sept. 20, 1989; 60 FR 15252, Mar. 23, 1995; 60 FR 37261, July 19, 1995; 61 FR 18986, Apr. 30, 1996; 62 FR 2038, Jan. 15, 1997; 62 FR 15992, Apr. 3, 1997; 62 FR 18926, Apr. 17, 1997; 63 FR 32590, June 12, 1998; 63 FR 36609, July 7, 1998; 64 FR 43095, Aug. 9, 1999; 65 FR 44008, July 17, 2000]

EFFECTIVE DATE NOTE: At 65 FR 44008, July 17, 2000, in § 90.203, paragraph (a)(1) was revised, effective October 16, 2000. For the convenience of the reader, the superseded text is set forth below.

§ 90.203 Certification required.

(a) * * *

(1) [Reserved]

* * * * *

§ 90.205 Power and antenna height limits.

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized to applicants whose license applications for new stations are filed after August 18, 1995 is as follows:

(a) *Below 25 MHz.* For single sideband operations (J3E emission), the maximum transmitter peak envelope power is 1000 watts.

(b) *25–50 MHz.* The maximum transmitter output power is 300 watts.

(c) *72–76 MHz.* The maximum effective radiated power (ERP) for stations operating on fixed frequencies is 300 watts. Stations operating on mobile-

only frequencies are limited to one watt transmitter output power.

(d) *150–174 MHz.* (1) The maximum allowable station ERP is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 1. Applicants requesting an ERP in excess of that listed in table 1 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

(2) Applications for stations where special circumstances exist that make it necessary to deviate from the ERP and antenna heights in Table 1 will be submitted to the frequency coordinator accompanied by a technical analysis, based upon generally accepted engineering practices and standards, that demonstrates that the requested station parameters will not produce a signal strength in excess of 37 dBu at any point along the edge of the requested service area. The coordinator may then recommend any ERP appropriate to meet this condition.

(3) An applicant for a station with a service area radius greater than 40 km (25 mi) must justify the requested service area radius, which will be authorized only in accordance with table 1, note 4. For base stations with service areas greater than 80 km, all operations 80 km or less from the base station will be on a primary basis and all operations outside of 80 km from the base station will be on a secondary basis and will be entitled to no protection from primary operations.

TABLE 1—150–174MHz—MAXIMUM ERP/REFERENCE HAAT FOR A SPECIFIC SERVICE AREA RADIUS

	Service area radius (km)									
	3	8	13	16	24	32	40	48[4]	64[4]	80[4]
Maximum ERP (w)[1]	1	28	178	[2]500	[2]500	[2]500	500	[2]500	[2]500	[2]500
Up to reference HAAT (m)[3]	15	15	15	15	33	65	110	160	380	670

[1] Maximum ERP indicated provides for a 37 dBu signal strength at the edge of the service area per FCC Report R–6602, Fig. 19 (See § 73.699, Fig. 10).

[2] Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 37 dBu.

[3] When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation: $ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})^2$.

[4] Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 37 dBu.

(e) *220–222 MHz.* Limitations on power and antenna heights are specified in § 90.729.

(f) *421–430 MHz.* Limitations on power and antenna heights are specified in § 90.279.

(g) *450–470 MHz.* (1) The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 2. Applicants requesting an ERP in excess of that listed in table 2 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

(2) Applications for stations where special circumstances exist that make it necessary to deviate from the ERP and antenna heights in Table 2 will be submitted to the frequency coordinator accompanied by a technical analysis, based upon generally accepted engineering practices and standards, that demonstrates that the requested station parameters will not produce a signal strength in excess of 39 dBu at any point along the edge of the requested service area. The coordinator may then recommend any ERP appropriate to meet this condition.

(3) An applicant for a station with a service area radius greater than 32 km (20 mi) must justify the requested service area radius, which may be authorized only in accordance with table 2, note 4. For base stations with service areas greater than 80 km, all operations 80 km or less from the base station will be on a primary basis and all operations outside of 80 km from the

base station will be on a secondary basis and will be entitled to no protection from primary operations.

TABLE 2—450–470 MHz—MAXIMUM ERP/REFERENCE HAAT FOR A SPECIFIC SERVICE AREA RADIUS

	Service area radius (km)									
	3	8	13	16	24	32	40[4]	48[4]	64[4]	80[4]
Maximum ERP (w)[1]	2	100	[2]500	[2]500	[2]500	[2]500	[2]500	[2]500	[2]500	[2]500
Up to reference HAAT (m)[3]	15	15	15	27	63	125	250	410	950	2700

[1] Maximum ERP indicated provides for a 39 dBu signal strength at the edge of the service area per FCC Report R–6602, Fig. 29 (See § 73.699, Fig. 10 b).
[2] Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 39 dBu.
[3] When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation: $ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})^2$.
[4] Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 39 dBu.

(h) *470–512 MHz.* Power and height limitations are specified in §§ 90.307 and 90.309.

(i) *764–776 MHz, 794–824 MHz, 851–869 MHz, 896–901 MHz and 935–940 MHz.* Power and height limitations are specified in § 90.635.

(j) *902–928 MHz.* LMS systems operating pursuant to subpart M of this part in the 902–927.25 MHz band will be authorized a maximum of 30 watts ERP. LMS equipment operating in the 927.25–928 MHz band will be authorized a maximum of 300 watts ERP. ERP must be measured as peak envelope power. Antenna heights will be as specified in § 90.353(h).

(k) *929–930 MHz.* Limitations on power and antenna heights are specified in § 90.494.

(l) *2450–2483.5 MHz.* The maximum transmitter power is 5 watts.

(m) *5850–5925 MHz.* The peak transmit output power over the frequency band of operations shall not exceed 750 mW or 28.8 dBm with up to 16 dBi in antenna gain. If transmitting antennas of directional gain greater than 16 dBi are used, the peak transmit output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 16 dBi, *i.e.,* the device's maximum EIRP shall not exceed 30 W EIRP. However, the peak transmitter output power may be increased to account for any line losses due to long transmission cables between the transmitter and the DSRCS device's antenna, provided the EIRP does not exceed 30 W.

(n) *All other frequency bands.* Requested transmitter power will be considered and authorized on a case by case basis.

(o) The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

[60 FR 37262, July 19, 1995, as amended at 62 FR 2039, Jan. 15, 1997; 63 FR 58651, Nov. 2, 1998; 64 FR 66409, Nov. 26, 1999]

§ 90.207 Types of emissions.

Unless specified elsewhere in this part, stations will be authorized emissions as provided for in paragraphs (b) through (n) of this section.

(a) *Most common emission symbols.* For a complete listing of emission symbols allowable under this part, see §2.201 of this chapter.

(1) The first symbol indicates the type of modulation on the transmitter carrier.

A—Amplitude modulation, double sideband with identical information on each sideband.
F—Frequency modulation.
G—Phase modulation.
J—Single sideband with suppressed carrier.
P—Unmodulated pulse.
W—Cases not covered above, in which an emission consists of the main carrier modulated, either simultaneously or in a preestablished sequence, in a combination of two or more of the following modes: amplitude, angle, pulse.